National Institute of Environmental Health Sciences

A temperature-limited assessment of the risk of Rift Valley fever transmission and establishment in the continental United States of America

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Abstract:

The rapid spread of West Nile virus across North America after its introduction in 1999 highlights the potential for foreign arboviruses to become established in the United States of America. Of particular concern is Rift Valley fever virus (RVFV), which has been responsible for multiple African epidemics resulting in death of both humans and livestock, as well as major economic disruption due to livestock loss and trade restrictions. Modern globalization, travel, and commerce allow viruses to easily jump from one continent to another; and it is likely only a matter of time before RVFV reaches North American shores. We used a degree-day model in combination with livestock population data and a pathways analysis to identify regions and times where RVFV is most likely to enter and become established in the United States of America. Transmission risk of the disease varies across the country from 325 annual risk days in parts of Florida to zero risk days in the far North and in high mountain regions. Areas of particular concern are where there are a high number of possible tranmission days, a large livestock population, and proximity to likely locations for the disease to enter the country via mosquito vector or human host. These areas should be monitored closely during transmission "risk seasons" so that if the virus does enter the country and begins to become established, it can be quickly controlled and eliminated before spreading further. Areas most at risk include the Baltimore and New York City metro areas as well as much of the region between these urban centers; most of Texas, especially around Houston; Florida; Atlanta; southwest Nebraska; southern California and Arizona; and the central valley of California.

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Temperature

Temperature: Fluctuations

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

United States

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Rift Valley Fever

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Short-Term (

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content